

REMARKS

Applicants thank the Examiner for the Examiner's timely and thorough search of the art and Office Action. Applicants, by this Amendment, have amended the Claims to overcome all deficiencies noted in the Examiner's Office Action. No new matter has been entered by this Amendment. After entry of this Amendment, Claims 1, 7 – 8, 13, 17 – 19, 22 – 32, 35 – 53, 55 and 57 - 71 remain pending in the Application.

CLAIM REJECTIONS

In the Office Action, the Examiner rejected Claim 21 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. According to the Examiner, there is no antecedent basis for “said plane”.

Claim 21 has been amended to provide appropriate antecedent basis for elements in Claim 21. The Examiner is respectfully requested to withdraw his objection to Claim 21 under 35 U.S.C. 112, second paragraph.

Continuing in the Office Action, the Examiner objected to Claim 27 because there appears to be missing some punctuation or a word or two in the second line. The Examiner also objected to Claims 35 and 57 because there appears to be missing a word after “affixed” in line 2.

Claim 27 has been amended to correct the deficiencies identified by the Examiner. The Examiner is respectfully requested to withdraw his objection to Claim 21.

The Examiner continued in the Office Action, rejecting Claim 54 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,621,465 to Judd et al. (hereinafter referred to as “Judd”). According to the Examiner, FIG. 14 of Judd discloses a ground plane (86) and a transmitting row and receiving row of antenna elements (88).

Claim 54 has been cancelled by this Amendment.

Continuing in the Office Action, the Examiner rejected Claims 1 – 6, 8, 13, 15, 21 – 22 and 32 – 33 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,175,333 to Smith et al. (hereinafter referred to as “Smith”) in view of U.S. Patent 3,618,104 to Behr (hereinafter referred to as “Behr”).

According to the Examiner, as to Claims 1, 15 and 32, FIG. 13 of Smith discloses an antenna array, but not an ultra wideband array element. The Examiner asserted that FIG. 1 of Behr discloses a ground plane (18) with an antenna element affixed to a first surface to emit and receive ultra wideband signals.

As to Claim 2, the Examiner asserted that FIG. 13 of Smith discloses an antenna array with at least one transmitting element (141).

As to Claims 3 and 21, the Examiner asserted that FIG. 13 of Smith discloses antenna elements (140 & 141) disposed in parallel receiving and transmitting rows.

As to Claim 4, the Examiner asserted that the antenna element disclosed in Behr exhibits an ultra wideband frequency response with a radial equidistant phase front in substantially all directions.

As to Claim 5, the Examiner asserted that the antenna element disclosed in Behr is a monoloop.

As to Claims 6, 8, 13 and 33, the Examiner asserted that the receiving elements (140) disclosed in FIG. 13 of Smith can be chosen to be equal in number to the transmitting elements (141) and are disposed in the receiving row such that each of the receiving elements (140) is aligned with respect to a corresponding transmitting element (141) disposed in the transmitting row with a unique spacing between corresponding elements.

As to Claim 22, the Examiner asserted that FIG. 3 of Behr discloses a tab (40).

According to the Examiner, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the element disclosed in Behr in the antenna disclosed in Smith for wider band performance as disclosed in Behr.

Claims 2 – 6, 15, 21 and 33 have been canceled by this Amendment.

Applicants respectfully traverse the Examiner's rejection of Claims 1, 8, 13, 22 and 32 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr.

Claim 1 has been amended to include elements originally presented in Claims 1, 3 and 5. Applicants respectfully disagree with the Examiner's assertion that Behr discloses a monoloop antenna element. Applicants incorporated by reference a co-owned and co-pending U.S. Pat. App. No. 09/753,244, filed January 02, 2001. That Application has issued on August 20, 2002, as U.S. Patent 6,437,756 to Schantz (hereinafter referred to as "Schantz"). Schantz described monoloop antennas, and that description is applicable in the present application:

Monoloop antennas are planar single element antennas that are preferably well matched to the standard 50Ω impedance design parameter employed in communication apparatuses. Monoloop antennas are efficient, physically small and radiate in a broad beam pattern. Such antennas exhibit some spatial dispersion, but they emit a waveform that is relatively short and non-temporally dispersive.

Monoloop antennas generally include a planar radiating loop, a ground plane reflector and a feed structure for providing signals between the antenna and a host device.

A planar radiating loop is preferably a generally planar, approximately semi-circular arc of a suitable conducting material. The plane in which the planar radiating loop is oriented is preferably normal to the plane of the ground plane. The preferred typical shape of the radiating loop is close to circular, but various elliptical, ovoidal, Archimedian and log spiral shapes may also be employed to advantage. It is important to note that the present invention is configured in contrast to teaching of the prior art relating to antenna construction. Rather than being configured to block or minimize reflection from the ground plane, the present invention is oriented to take advantage of the reflections from the ground plane.
[Schantz; Col. 6, lines 33 – 55; emphasis added]

Behr does not disclose a monoloop antenna. Behr discloses an antenna element 10 with a rectangular cross section such that an upper surface 24 and a lower surface 26 comprise upper and lower walls of electrically conductive material, such as copper sheeting or the like. [Behr; Col. 2, lines 1 – 5] Behr refers to his antenna element 10 as having four walls that define a cornucopia-shaped antenna element referred to as the "Horn of Plenty" or "HOP" antenna. The upper and lower surfaces 24 and 26, respectively, have an arcuate nonlogarithmic surface which diverges from the small end termination 12 to the larger

end termination 16 attached to the ground plane 18. [Behr; Col. 2, lines 6 – 12] Behr discloses an alternate embodiment in FIG. 3 having a rectangular cross-section and discloses another alternate embodiment in FIG. 5 having a curvilinear (specifically, circular) cross-section.

Behr illustrates in his FIG. 9 a cutaway portion of the HOP antenna element including means located internally thereof for turning the shaft of a variable capacitor. [Behr; Col. 4, lines 50 – 53; emphasis provided] It is clear that Behr's HOP antenna element is not planar – especially as it has room internally for mechanical actuating mechanisms.

None of Behr's disclosed embodiments anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious the present invention with a monoloop antenna element. Applicants have rewritten Claim 1 to include elements originally claimed in Claims 3 and 5 so that newly amended Claim 1 is a rewriting of Claim 5 in independent form including all of the limitations of the base claim (original Claim 1) and any intervening claims (original Claim 3).

Applicants respectfully submit that amended Claim 1 is patentable over the art of record and the Examiner is requested to remove his rejection of Claim 1.

Claim 8 has been rewritten in independent form including all of the limitations of its base claim (original Claim 1) and any intervening claims (original Claims 3 and 6).

Claim 13 has been rewritten in independent form including all of the limitations of its base claim (original Claim 1) and any intervening claims (original Claim 3).

Applicants have rewritten Claim 32 to include elements originally claimed in Claims 32 and 33 so that newly amended Claim 32 is a rewriting of Claim 33 in independent form including all of the limitations of the base claim (original Claim 32). There are no intervening claims.

Applicants respectfully submit that Claims 8, 13 and 32 are patentable over the art of record. None of the art of record – including Smith, Behr, Berkowitz, Koslover and Judd – anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious transmitting element and receiving elements being disposed in parallel rows such that inter-element spacing is substantially unique for each neighboring pair of elements in the parallel rows.

Applicants respectfully submit that Claims 8, 13 and 32 are patentable over the art of record and the Examiner is requested to remove his rejection of Claims 8, 13 and 32.

Applicants respectfully disagree with the Examiner's assertion that Behr discloses a tab (40). In his FIG. 4, Behr illustrates a tubular male member 41 of his connector 40 which is adapted to mate with the finger elements 42 and the inner surface 44 of housing 46. Behr's element 40 is a connector for coupling electrical energy to be radiated from the HOP antenna. [Behr; Col. 3, line 73 – Col. 4, line 6]

Claim 22 has been rewritten in independent form including all of the limitations of its base claim (original Claim 1) and any intervening claims (original Claim 3). Claim 22 provides that “each of the plurality of antenna elements comprises a tab”. None of the art of record – including Smith, Behr, Berkowitz, Koslover and Judd – anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious antenna elements comprising tabs.

Applicants respectfully submit that Claim 22 is patentable over the art of record and the Examiner is requested to remove his rejection of Claim 22.

The Examiner continued in the Office Action, rejecting Claims 10 – 12, 20 and 55 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr and further in view of Judd.

As to Claims 10 – 12, the Examiner asserted that Judd discloses using dummy elements to create a symmetrical radiation pattern (referring to Col. 5, lines 27 – 34; Judd).

As to Claims 20, the Examiner asserted that FIG. 6 of Judd discloses a fence (60) between the receive and transmit rows for improved isolation.

As to Claim 55, the Examiner referred to his rejection of Claim 6, set forth above.

According to the Examiner, it would have been obvious to one of ordinary skill in the art at the time of the invention to [use] dummy elements and a fence as disclosed in Judd with the antenna disclosed in Smith and Behr for improved antenna performance.

Applicants have cancelled Claims 10 – 12 and 20 by this Amendment.

Applicants respectfully traverse the Examiner's rejection of Claim 55 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr and further in view of Judd.

Claim 55 has been rewritten in independent form including all of the limitations of its base claim (original Claim 54). There are no intervening claims.

None of the art of record – including Smith, Behr, Berkowitz, Koslover and Judd – anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious transmitting element and receiving elements being disposed in parallel rows such that inter-element spacing is substantially unique for each neighboring pair of elements in the parallel rows as claimed in Claim 55.

Applicants respectfully submit that Claim 55 is patentable over the art of record and the Examiner is requested to remove his rejection of Claim 55.

Continuing in the Office Action, the Examiner rejected Claims 9, 14, 16-19, 34 and 56 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr and further in view of U.S. Patent 5,255,004 to Berkowitz (hereinafter referred to as "Berkowitz").

As to Claims 17 – 18, the Examiner asserted that FIG. 5 of Berkowitz discloses a first column with offset displaced antenna elements.

As to Claims 16 and 19, the Examiner asserted that FIG. 5 of Berkowitz discloses elements obliquely orientated with respect to neighboring elements.

As to Claims 9, 14, 34 and 56, the Examiner asserted that Berkowitz discloses the random spacing of antenna elements (referring to Col. 7, lines 39 – 54; Berkowitz). The antenna element orientation and spacing is asserted to result in improved antenna characteristics (referring to Abstract; Berkowitz).

According to the Examiner, it would have been obvious to one of ordinary skill in the art at the time of the invention to position the antenna elements disclosed in Behr as disclosed in Berkowitz to obtain desired antenna characteristics as disclosed in Berkowitz.

Applicants have cancelled Claims 9, 14, 16, 34 and 56 by this Amendment.

Applicants respectfully traverse the Examiner's rejection of Claims 17-19 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr and further in view of Berkowitz.

Claim 17 has been rewritten in independent form including all of the limitations of its base claim (original Claim 1) and any intervening claims (original Claim 3).

Claim 17 recites that "each transmitting element comprising said transmitting row is alternately displaced laterally" (emphasis provided). Claim 18 is dependent upon Claim 17 and recites that "each receiving element comprising said receiving row is alternately displaced laterally" (emphasis provided). In contrast, Berkowitz provides for angular displacement of antenna elements (referred to as "tilt" by Berkowitz; Col. 3, line 53). Berkowitz requires unipolar element tilt angles of equal but opposite magnitude on either half of a planar array (Berkowitz; Col. 3, lines 57 – 59). Nowhere does Berkowitz anticipate, disclose, teach, show, suggest, infer or in any way render obvious laterally displacing alternate elements in a transmitting row laterally (as recited in Claim 17). Berkowitz does not disclose laterally displacing alternate elements in a receiving row laterally (as recited in Claim 18).

None of the art of record – including Smith, Behr, Berkowitz, Koslover and Judd – anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious laterally displacing alternate transmitting elements from a line.

Claim 19 depends from Claim 18. Therefore, the antenna elements claimed in Claim 19 are alternately laterally displaced in both the transmitting line and the receiving line, as well as being obliquely oriented with respect to a neighboring element in a row. None of the art of record – including Smith, Behr, Berkowitz, Koslover and Judd – anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious such a structure having both lateral and oblique displacement.

Applicants respectfully submit that Claim 17 is patentable over the art of record. Claims 18 and 19 depend from Claim 17. Because Claim 17 is patentable, Claims 18 and 19 are themselves each respectively patentable.

Applicants respectfully request the Examiner to remove his rejection of Claims 17 - 19.

The Examiner continued in the Office Action, rejecting Claims 23 – 24, 35, and 57 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr and further in view of U.S. Patent 5,323,169 to Koslover (hereinafter referred to as “Koslover”).

As to Claims 23 – 24, 35 and 57, the Examiner asserted that Behr discloses a coaxial cable coupled to the antenna tab, not a waveguide coupled to the tab. The Examiner asserted that Koslover discloses using a waveguide feed for an ultra wideband antenna for improved gain characteristics (referring to Abstract; Koslover).

According to the Examiner, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a waveguide as disclosed in Koslover with the antenna element disclosed in Behr for improved gain characteristics.

Applicants respectfully traverse the Examiner's rejection of Claims 23 – 24, 35, and 57 under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Behr and further in view of Koslover.

Smith discloses a flat plate antenna array element fed by a power supply circuit pattern or distribution network 214 of conducting strips with terminations 216, called probes (Smith; Col. 5, lines 2 – 6).

Behr discloses a non-planar HOP (Horn of Plenty) antenna element having a rectangular or curvilinear cross section. Applicants have earlier herein respectfully disagreed with the Examiner's assertion that Behr discloses a tab (40). In his FIG. 4, Behr illustrates a tubular male member 41 of his connector 40 which is adapted to mate with the finger elements 42 and the inner surface 44 of housing 46. Behr's element 40 is a connector for coupling electrical energy to be radiated from the HOP antenna. [Behr; Col. 3, line 73 – Col. 4, line 6] As the Examiner has stated, Behr discloses a coaxial cable coupled to his connector 40.

Koslover discloses an ultra wideband TEM (Transverse ElectroMagnetic) mode parallel-plate planar transmission-line-array horn antenna.

None of Smith, Behr or Koslover, and no combination of Smith, Behr and Koslover or any other art of record anticipates, discloses, teaches, shows, suggests, infers or in any way renders obvious planar antenna elements on a first surface of a ground plane coupled through the ground plane via tabs with a waveguide co-planar with a second surface of the ground plane.

Applicants respectfully submit that Claims 23 – 24, 35 and 57 patentably distinguish over the art of record.

The Examiner is respectfully requested to remove his rejection of Claims 23 – 24, 35 and 57.

ALLOWABLE SUBJECT MATTER

Continuing in the Office Action, the Examiner stated that Claims 7, 25 – 31, 36 – 49 and 58 – 71 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 7 has been rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 25 – 31 have been selectively amended to correctly reflect dependencies following changes made pursuant to this Amendment. Claims 25 – 31 are now believed to ultimately depend from allowable claims, and are therefore themselves each respectively allowable.

Claims 36 – 49 have been selectively amended to correctly reflect dependencies following changes made pursuant to this Amendment. Claims 36 – 49 are now believed to ultimately depend from allowable claims, and are therefore themselves each respectively allowable.

The Examiner allowed Claims 50 – 53.

None of the art of record – including Smith, Behr, Berkowitz, Koslover and Judd – individually or in any combination with each other anticipates discloses, teaches, shows, suggests, infers or in any way renders obvious the present invention as claimed in Claims

1, 7 – 8, 13, 17 – 19, 22 – 32, 35 – 53, 55 and 57 – 71. It is respectfully submitted that Claims 1, 7 – 8, 13, 17 – 19, 22 – 32, 35 – 53, 55 and 57 – 71 patentably distinguish over the art of record.

The Office Action set a shortened statutory period for reply to expire three (3) months from the mailing date of March 19, 2004. Because the three month reply period expires on a Saturday (June 19, 2004), Applicants respectfully submit that this reply is timely filed on Monday June 21, 2004, as provided by 37 C.F.R. 1.7.

Since Applicants have fully and completely responded to the Official Action, this Application is now in order for early action and such early action is respectfully requested. If the Examiner would deem a telephone conference to be of value in expediting this Application, he is invited to call the undersigned attorney at (972) 758-1955 at his convenience.

Respectfully submitted,



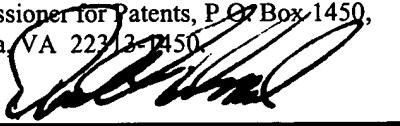
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